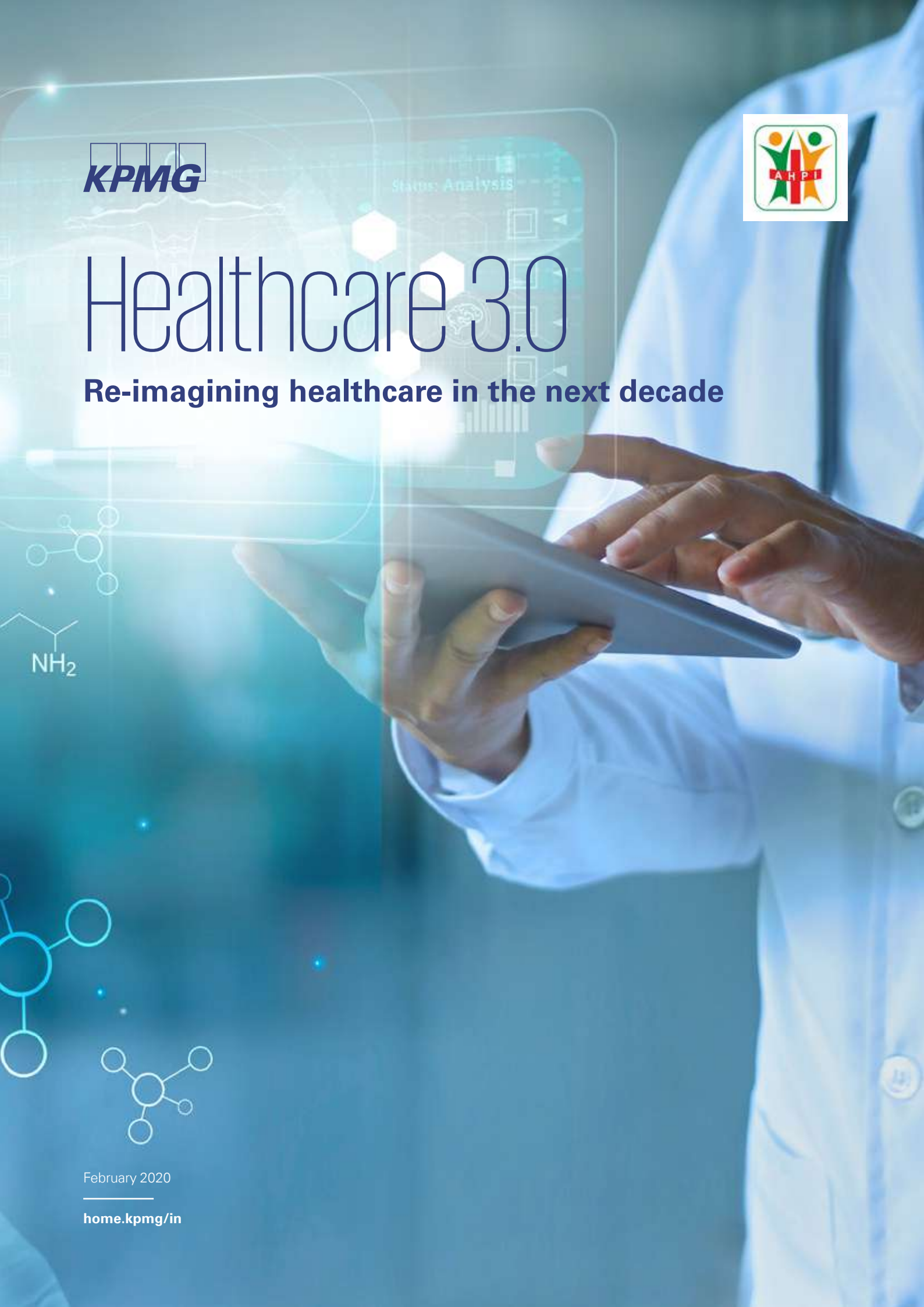


Healthcare 3.0

Re-imagining healthcare in the next decade

February 2020

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Foreword by Association of Healthcare Providers (India)

Over the years India has made rapid strides in health parameters such as life expectancy, mortality rates, immunisation, among others. The Indian Healthcare system is currently at a very critical juncture, where it not only needs to overcome key healthcare challenges, but also needs to progress towards path of Universal Health Coverage (UHC). The current healthcare system of the country is burdened due to the limited access to healthcare, insufficient availability of manpower, sub-optimal quality of health services and high out-of-pocket (OOP) expenditure. Vital decisions around the four pillars of availability, affordability, accessibility and acceptability need to be taken to tackle these challenges.

Healthcare is traditionally seen as a social sector in India, with limited government focus and low budget allocation with a focus mainly on curative care. Significant progresses have been made through a number of initiatives, including the flagship National Rural Health Mission, National Urban Health Mission, Rashtriya Swasthya Bima Yojana, and most recently Ayushman Bharat that covers the cost of secondary and tertiary-level hospitalisation for underprivileged population. However, with rising disposable incomes, changes in lifestyle, coupled with increasing population, the disease patterns are changing significantly from communicable to sedentary-lifestyle related diseases. This needs a paradigm shift in terms of our healthcare policies as well as in establishing synergy between public and private health sectors.

Considering that more than 85 per cent of tertiary care beds are in private sector, various models need to be considered to make healthcare available and accessible. Prime Minister has desired for opening of 2500-3000 new hospitals in tier-II/III cities and where private sector can play pivotal role specifically around areas like patient centric infrastructure development, developing technologies, standardisation of practices, capacity building and attaining economies of scale. This would lay the foundations for a wider healthcare marketplace with innovative product offerings, encourage new market entrants in the wake of possible newer investment avenues. With the consistently growing role of technology in our everyday life, there is a compelling need to make the way health is sought **'smarter'**.

Patient Safety in delivery of healthcare needs greater attention. Monitoring and measuring of sentinel events and medical errors needs to become culture. Doctors need to take greater leadership role in driving quality and patient safety. Quality accreditation like NABH and National Patient Safety Implementation (2018-25) needs to be incentivized. This will further help in reducing morbidity and mortality. This report, by the Association of Healthcare Providers in India and KPMG tries to delve deeper into the imminent changes in the healthcare arena so as to become major sector driving social wellbeing. It has also huge potential in becoming economic driver by way of employment generation and even providing healthcare professionals to the world.



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Foreword by KPMG in India

Healthcare in India is being reimagined due to the various market forces in play which are transforming the pattern of consumerism, dependency on digital technologies, provider landscape, diagnosis, healthcare workforce, disease burden and regulatory regimes. The government is also taking steps to ensure delivery of accessible and affordable services through its Ayushman Bharat scheme, which in turn is laying foundation of value-based healthcare in India. Furthermore, they are aiming to equip Health and Wellness centres and primary care centres proposed under Ayushman Bharat, with telemedicine tools to improve referral advice, seek clarification and undertake virtual training including case management support by specialist.

New healthcare models or ecosystem of solutions are being envisioned and implemented in India which are allowing providers to save time, helping patients to take control of their health data, and forcing healthcare organisation to change their business models to include more personalised treatments. Delivery of care is also being reimagined so that the hospitals move beyond the bricks and mortar, particularly if the patients are aged or are suffering from chronic conditions. Technological advancements have made it possible for patients to receive care beyond the hospitals, which helps to save both time and money.

In future, organisation will compete not only by their ability to manage health data but use it to deliver experiences in real time that are matched to the patients and their needs. The report focuses on forces and lever of changes impacting the healthcare landscape. These forces are likely to demand changes healthcare providers are operating. A timely action to the changing landscape would enable providers to turn it into opportunities. The report also provides some key pointers on how they can reimagine their healthcare services in their portfolio by understanding the changing care needs of the patients/consumersand build solutions suited to various healthcare initiatives being taken up by the government.



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Executive summary

Change is the law of nature and this law applies to businesses running in modern times. Like other industries, healthcare is also approaching towards transformation beyond recognition. Several technological, regulatory, and operational changes are set to transform the way the public health system works, patients are treated, and private providers operate. In the next decade, the healthcare industry in India is hoping to transform into Healthcare 3.0 with improved healthcare access, focus on the quality of healthcare, use of innovative diagnostics and treatment methods, improved transparency and patient centered models of healthcare delivery.

The healthcare industry in the times ahead will be shaped by many forces, however the critical forces governing the emergence of Healthcare 3.0 in the next decade includes focus on Universal Health Coverage (UHC) to improve patient access and to prevent catastrophic healthcare expenditures; strengthening of the healthcare system through strategic purchasing, risk pooling and improving the overall delivery; and impetus on digital healthcare to counter the challenges of workforce shortage and operational inefficiencies. These forces are not the only factors demanding a change, the underlying levers of change are also playing their part in changing the landscape of the market. These key levers of change will compel the providers to deliver better health outcomes while managing changing consumer behaviour.

In this paper, we explore the key levers of change and key trends likely to be witnessed in the coming decade.

These include:

1. Owing to the emergence of digital disrupted business models, consumer behavior and consumer buying life cycles are rapidly changing. The same will be witnessed by the healthcare sector with patients turning into smart consumers. Patients will be more aware, participate actively in healthcare decisions, focus more on self -care, demand quick turn-around as well as transparency
2. Healthcare is also set to witness impact of technology. Digital health driven transformation will drive plethora of changes, which includes shift to mhealth, AI-enabled care, extensive use of augmented and virtual reality (AR/VR), Use of IoT devices and connected care, advent of medical drones and utilizing technologies such as block chain to bring more transparency
3. Healthcare providers will also be seen relooking the market and will move towards leaner facilities, focusing on-demand healthcare services, virtual care and digital clinics. Changes in consumer behavior and regulatory landscape will eventually compel providers to change their engagement strategy with patients.
4. The gradual shift from curative to preventive care and advent of technology will also change the way diagnosis and treatment are done. Innovations such as noninvasive and AI based diagnosis, robotic assisted surgeries, gene therapy, personalized medicine and evidence-based medicine are some of the trends which change the way care is provided
5. Lack of adequate and skilled workforce are amongst the key challenges in the current healthcare system. The newer landscape will witness a close association between healthcare workforce advances in artificial intelligence – cognitive computing, deep learning and machine learning. Also, the focus will be on ensuring adequate training to the existing and upcoming lot of workforce in area of handling newer technologies and soft skills
6. Increasing environmental compliance, waste management, price control, reporting of outcomes, safety and security and other regulatory compliances will remain top priorities for the government and providers. The changing regulatory environment will hugely impact the strategy of the providers to provide services.

Understanding the forces changing the healthcare landscape and devising a clear strategy to act upon it will prove to be a daunting task. To plan for the forthcoming Healthcare 3.0, providers need to kick start their journey and ensure that necessary steps are taken at the right time. For this there is a need to focus on patient experience, investing smartly in relevant technologies, establishing ecosystem through collaboration, establish an agile but robust governance structure. This document highlights key action points for providers to prepare them for the transformation about to happen in the coming decade.

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1 Forces transmuting Indian healthcare system into Healthcare 3.0

Indian private healthcare sector has played major role in strengthening the Indian healthcare system in the last three decades. During this period, it has passed through two significant eras of evolution in terms of Healthcare 1.0 and Healthcare 2.0.

About three decades ago, the private sector mainly comprised of a limited number of solo medical practitioners with nursing homes and small hospitals. Availability of secondary and tertiary care was very limited and largely was served by the hospitals operated by government charitable trusts and religious foundations. This era, **Healthcare 1.0**, was mainly attributed to limited awareness about healthcare among people and relied mainly on the conventional methods of care. Patients played passive role in care models and it was a totally practitioner-led care system.

With ever increasing demand of hospital care, skewed geographic distribution of hospitals and dire need of adequate secondary and tertiary care healthcare facilities, several private investors saw a huge growth potential in the healthcare sector. Also, advent of newer medical technology made it difficult for the smaller hospitals and nursing homes to sustain and cater to growing needs. This led to the growth of private hospitals and corporate hospitals backed by private investors. This era, **Healthcare 2.0**, continues till today and has been witnessing development of world class healthcare infrastructure, investment in advanced medical technology and upskilling of clinicians and paramedics. This era also experienced a large focus on the quality of care and accreditation with a pool of 38 JCI and 615 NABH accredited hospitals[1,2] and more than 180 medical institutes. The Healthcare 2.0 phase experienced hundreds of mergers & acquisitions and consolidation of providers into larger hospital chains and emergence of asset light healthcare formats, organized single specialty care, pharmacy and diagnostic chains, digital platforms, alternative care models and patient focused health and wellness services. The government launched several initiatives such as Ayushman Bharat, National Health Mission and various national and state level health programmes to address communicable diseases (CDs) and non-communicable diseases (NCDs). However, Indian healthcare providers both public and private have made limited investment and adoption of digitisation as compared to other sectors such as retail and banking. Currently most of private hospitals lack electronic medical records, digitation of patient data, health analytics and other emerging technologies like AI and block chain.

With initiatives and policies by government, ever increasing demand and competition among the private providers and changing patients' needs and increasing penetration of technological innovations, healthcare in India is set to witness a new era - **Healthcare 3.0**. This era will push Indian private healthcare providers to relook at their business models and operations in line with changing ecosystem shaped by evolution in healthcare and other sectors that has transformed Indian consumer. The shaping of the current healthcare system to Healthcare 3.0 in the next decade will be majorly attributed to three compelling forces:

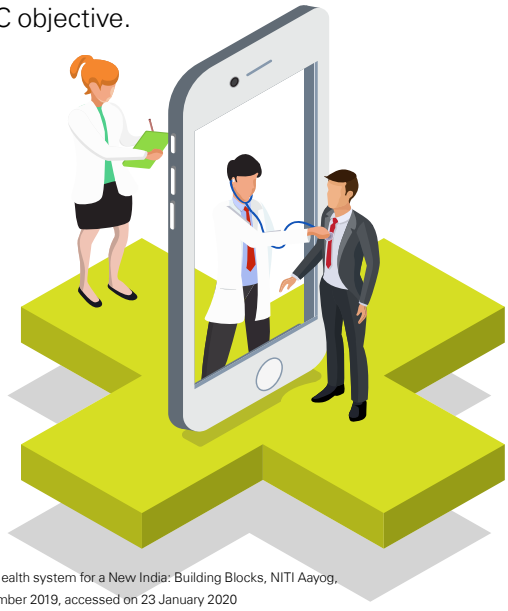


1. National Board of Accreditation for Hospitals and Healthcare Providers, accessed on 20 January 2020
2. JCI accredited Hospitals, Joint Commission International, accessed on 20 January 2020
3. NITI Aayog mulls healthcare system for middle class, Business Today, November 2019, accessed on 23 January 2020
4. A report on High Level Group on Health Sector, 2019, accessed on 25 January 2020

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1) Big leap towards Universal Health Coverage (UHC)

Like many other countries, India has also committed to achieve UHC by 2030 in the context of the Sustainable Development Goals (SDGs). With a view to achieve UHC, the Indian government launched Ayushman Bharat (2018), providing secondary and tertiary care services to the underprivileged section of the society. To take a step further on UHC, the government is expected to cover a larger section of the population. As per NITI Aayog's recommendations, in a report released in November 2019, all the healthcare schemes should be brought under a common coordination arrangement. It also provided recommendations on covering the 50 per cent of the population, which includes the middle class, not covered under any public schemes through co-payment[3] . Also, A recent report of High-Level Group on Health Sector – Finance Commission, India, 2019 recommends devising comprehensive health insurance scheme under the ambit of Ayushman Bharat Scheme covering for people under formal employment on a no profit and no loss basis, with the help of National Health Authority (NHA)[4] . With such vision and recommendations, the government is likely to act upon and the health sector is set to witness increased patient access, rise in the utilisation of healthcare services and better health outcomes. With limited public infrastructure and predominance of private healthcare in India, private providers have a crucial role to play in realisation of UHC objective.



5. Health system for a New India: Building Blocks, NITI Aayog, November 2019, accessed on 23 January 2020

2) Efforts towards health system strengthening

The NITI Aayog report on healthcare system strengthening released in November 2019, details out the vision of enhancing healthcare quality, efficiency and access of healthcare services and it's delivery by focusing on outcomes without financial burden, thereby assisting key initiatives such as AB-PMJAY[5]. The efforts towards strengthening the overall system are governing the steps taken by both public and private healthcare providers. Some of the key areas where focus must shift to strengthen the current healthcare system:

1. **Risk pooling:** Includes reforms to improve performance of private insurance players; consolidate multiple intra state schemes; government funded services providers e.g. ESIS, CGHS Railways etc.; incentivisation of voluntary contribution for risk pooling schemes by the non-poor population and enhancing performance as well as standardisation rules of others.
2. **Strategic purchasing:** Includes defining, standardizing and continuous evolution of all the key elements of engagement between insurers. For strategic purchasing it is important to define the coverage population; standardising the contract terms and KPIs for providers; deciding prices for purchase of services for primary care OPD and IPD; independent accreditation bodies for monitoring quality; and standardisation of payment mechanism, costing templates and devising plans for implementation.
3. **Health services delivery:** Enhancing the performance of public and private delivery models - to be achieved by developing organisational platform for consolidating small providers, implementing care coordination models across various level of care, providing greater management autonomy to public hospitals; and focusing on incentivisation of hospitals.

Recently government also announced setting up hospitals under public private partnership (PPP) mode, especially in aspirational districts lacking Ayushman empaneled hospitals. With such efforts, the healthcare system is expected to witness innovative models of healthcare delivery and will see an active participation of the private sector.

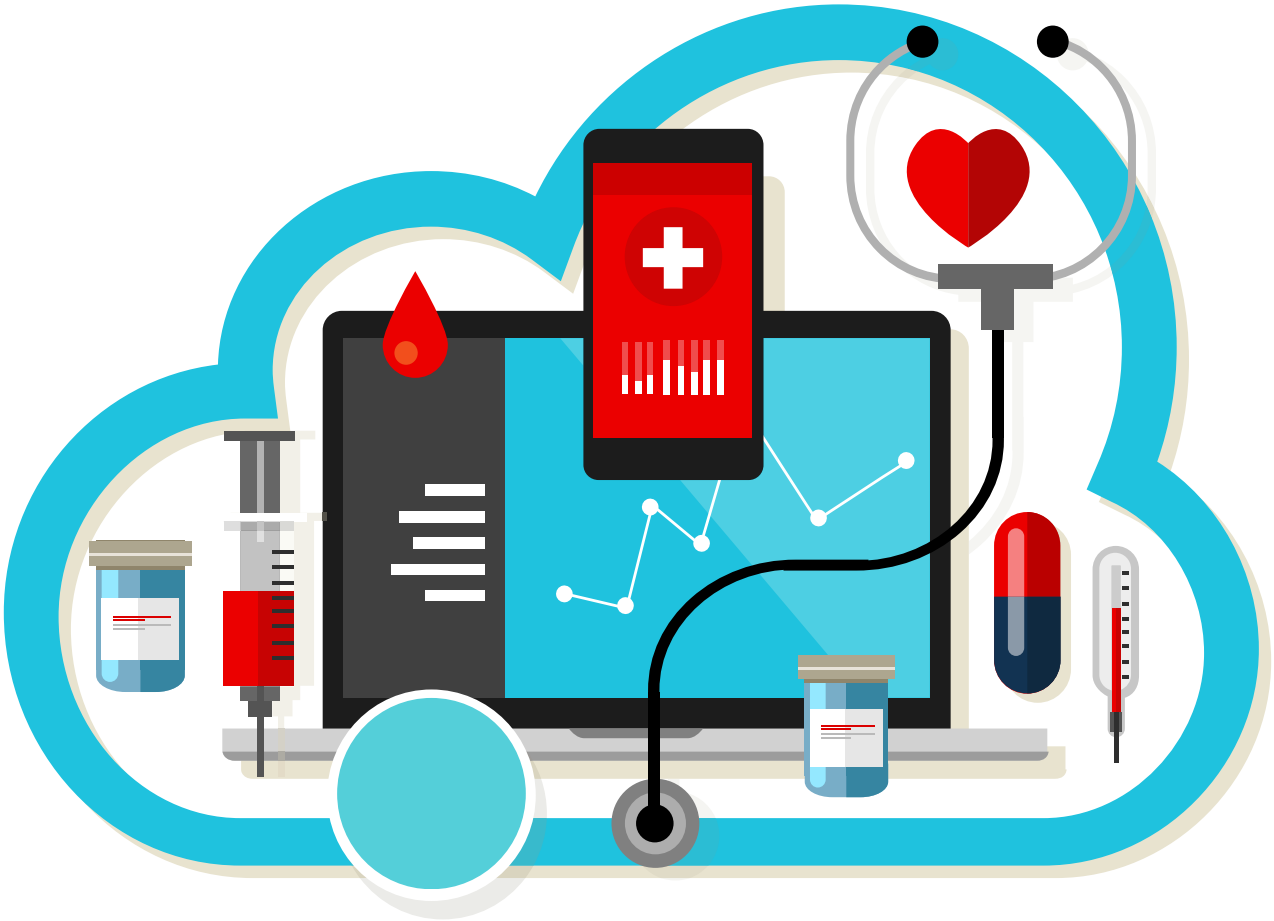
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3) Impetus on digital health

The focus on digital health is one of the strongest forces which will bring change in the delivery of healthcare services. It is also important for efficient implementation of large healthcare schemes such as AB-PMJAY, bringing transparency and streamlining transactions among payers and providers, monitoring and controlling fraud, standardising platforms and nomenclature for interoperability, monitoring and analysing critical KPIs of utilisation and efficiencies. With government envisaging the National Health Stack for digitisation of the healthcare records[6]; focus on Hospital Information System and Healthcare Insurance Information Platform; increasing number of health apps for monitoring NCDs, and use of AI based predictive care platforms, the healthcare system will witness several changes from technology perspective.

As per the recent announcements, the government will also focus on use of artificial intelligence (AI) and machine leaning (ML) to improve implementation of initiatives such as Mission Indradhanush and Ayushman Bharat, especially targeting complex diseases such as cancer to define and decide treatment regimes[7].

With these key forces steering the healthcare system, private sector has a big role to play not only in achieving the desired outcomes but also shaping up the overall market. The government alone cannot drive the vision and requires a synergistic partnership with the private sector for building the required infrastructure and providing quality care and driving the market towards the envisaged Healthcare 3.0.



6. Creation of National Health Stack, Press Information Bureau, July 2018, accessed on 23 January 2020
7 Union Budget PoV, KPMG, 01 February 2020, accessed on 02 February 2020

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Key levers of change - Healthcare 3.0

Private healthcare has witnessed tremendous advancement in technology and in models of operations, with most of these changes being driven by changing patient perception owing to the rising health awareness. These forces are not the only factor demanding a change in providers' view towards the sector, the underlying levers of change are also playing their part in changing the landscape of the market. These key levers of change will compel the providers to deliver better health outcomes whilst managing evolving consumer behaviors and patient treatments:



Metamorphosis of patients into smart consumers: 'Patients' are taking the focus of delivering healthcare services and will grow in importance and will demand best in class services. Owing to this, the market will witness rise of prevention and outcome-based models, placing patients firmly in control of their own health and treatments



Digital health disrupting healthcare landscape: With the advent of technology, expanding healthcare data, advances in connected devices including sensors, wearables, implantable, clinicians are now better able to track patient health. Advances in artificial intelligence and medical robotics are paving the path towards hybrid healthcare workforce. Big hospital chains are leveraging the concepts of artificial intelligence for cancer diagnosis and treatment. Also, increasing penetration of telehealth is pushing delivery of healthcare services to patients' door steps



New avatar of healthcare providers: With falling margins, the market is now favouring smaller and super-specialised hospitals. The future is expected to witness re-emergence of nursing homes. Also, healthcare awareness and availability of connected tools are empowering patients, providing greater transparency and choice. This is leading to rise of health tech startups, entry of technology players in the healthcare domain and compelling the existing players to build platforms enabling access to health information and advice when and where it suits consumers



Innovative diagnosis and treatment: Innovation in diagnosis and medical treatment – ranging from robotic surgeries to genome sequencing and developing personalized medicine – remains one of the most powerful force shaping the healthcare market



Budding hybrid healthcare workforce: The skilled health workforce in India does not even fulfill the minimum threshold set by WHO (i.e. ~22.8 skilled workforce per 10,000 population)[8]. To counter the challenges of a lack of trained personnel, technology will play a crucial role in not just imparting training through augmented and virtual reality but also by aiding doctors and surgeons in providing treatment



Growing regulatory and governance framework: The Indian Healthcare System has been witnessing implementation of policies and initiatives in areas of healthcare infrastructure, accessibility, affordability and investment. The Personal Data Protection Bill, draft Digital Information Security in Health Care Act (DISHA) and other such regulations will demand stringent compliances and safeguarding of personal and medical records by healthcare providers. To drive transparency and value-based healthcare, providers eventually would be required to report and track outcomes of patients. The changing healthcare landscape is likely to witness simplification of a number of regulatory compliances to support the emerging models of care.

8. Skilled health workforce in India does not meet WHO recommended threshold, British Medical Journal, May 2019, accessed on 18 January 2020

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2 Key trends to be witnessed in Healthcare 3.0

1) Metamorphosis of patients into Smart Consumer

In the last decade India witnessed a transformation in the consumption pattern led by the wave of internet, social media, mobile connectivity and technological developments. This led to shift of business models and emergence of digital disrupted business models that radically changed consumer behavior and consumer buying life cycle. Today majority of businesses are digitally enabled and certain consumer facing companies have completely shifted to digital operations– like cab services, retail, banking, insurance and others. This digital enablement has led to information being barged on to the consumer from everywhere with instant, accessible services and buying anywhere and anytime they want. The Indian consumer behavioural change has already passed a transition phase and coming decade will witness smart consumers.

Indian healthcare sector is not untouched with new consumer behavioural trends and there is plenty of evidence to indicate that healthcare eventually in the coming decade will be led by the dictates of the consumer instead of by government say-so or industry initiatives. The Indian Healthcare 3.0 will witness emergence of smart consumer with following behavioural trends:

Highly aware 	India's internet adoption and smartphone users are growing at double digit across urban and rural areas. In this era, a patient has an easy access to plethora of health-related information that has led to changing consumer behaviour. A smart consumer will be highly aware of healthcare needs, well informed about health conditions, self-care and will self-navigate to appropriate healthcare settings.
Active participation 	Amidst increasing awareness on health-related issues and healthcare needs in general, today's patient's participation will transform from 'Passive' to 'Active'. We will witness a shift from doctor driven to patient driven healthcare delivery system with patients playing an active part in decision-making regarding their health management, treatment regimes and outcomes.
Focused on self-care 	Self-care will be key to Indian Health System in the coming decade and increasing healthcare cost, constraints of healthcare resources and changing consumer healthcare behaviour will drive most fundamental restructuring of healthcare in India. Prevention of disease and increasing efforts to educate and support patients in managing their own health will be on high priority in the coming decade. Patients, governments and healthcare providers would be pushing for self-care with electronic health records, personal health tracking devices and health applications for a remote support.
On-demand services 	Smart consumer exposed to various digital businesses like cab services, on-demand entertainment, anytime banking, retail and others, will led to increased expectations of on-demand healthcare services from providers in the coming decade. Smart consumers will seek on-demand 24x7 doctor consultation, treatment, diagnosis and other such healthcare services without the constrains of time, place and commuting.



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Demand for quick turnaround 	Smart consumers will be wired with on-demand, anytime and anywhere services. Healthcare setting will have to drastically cut down service turnaround-time as smart consumer will demand minimal turn-around time.
Quality and cost conscious 	Increasing information and technology development will enable smart consumer with awareness for quality of care, ability to benchmark cost and services and refer to ratings of doctors, hospitals and other providers to make buying decision.
Demand transparency 	Consumers will demand transparency around healthcare services, treatment options, outcomes, risk, cost of care, quality of service, safety and credentials of healthcare professionals Indian healthcare providers will have to practice more transparent operations, openness to share and publish key patient information and indicators that enable smart consumers to build higher satisfaction, and greater trust
Newer needs 	Newer services like Certified Professionals in Life Coaches, Mental Health Coaches, Digital & Social Media Detoxification and other such services that are not served in the current gamut are likely to become prominent
Personal data and personalized care 	The increasing adoption of personal technologies has opened the gateway to the convergence of patient's medical data with a deluge of non-medical, lifestyle-related data, much of which is generated by the patient. A smart consumer will be more informed, conscious, demand privacy and security and custodian of their personal data. The healthcare providers will eventually be exposed to larger personal data, governance and requiring governance that will inherently be more effective and focuses on patient care.
Patient communities 	Healthcare will see increasing online and offline patient communities referred to as treatment or disease-state communities. Online health communities (OHCs) would be preferred platform to reach out to find information, assistance, and patient experience and journey. Pharmaceutical, medical device companies and other healthcare providers will be key contributor of rich content to such communities. Providers will be required to actively engage and respond to such communities and address positive and negative profiling.
Fluid buying cycle 	In the past, a patient used to transition through family physician, word of mouth of family and friends. Now, a smart consumer's buying journey mostly starts with a search engine and is no longer linear. A smart consumer would have already completed initial stages of health seeking journey online before visiting a doctor or healthcare setting. Providers will have to engage at early stage of buying with rich health information and credentials that enables smart consumer to steer appropriately to their healthcare setting.

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2) Digital health - Disrupting healthcare landscape

Advancements in technology has been a key driving force for shaping any sector. Healthcare is also set to experience an unprecedented impact of technology and reshaping its ecosystem and building foundation blocks towards connected comprehensive care. Digital health driven transformation will force reconfiguration of the current healthcare value chain in India. Some of the key digital health trends that will drive Healthcare 3.0 are:

Resurgence of telemedicine 	The next decade will observe resurgence of interest and demand in telemedicine fueled by technology advancements and availability of 5G (fifth generation wireless technology for digital cellular networks). Telemedicine 3.0 would be highly technology enabled and would operate at feeble connectivity. Smart consumers across rural and urban areas will demand telemedicine services through health centres and mobile based telemedicine applications.
Shift to m-health 	Healthcare 3.0 will largely be accessed and delivered through m-health with India being the 3rd largest smartphone market, increasing internet users and launch of 5G. Healthcare providers will be challenged to disintegrate their existing model of care and embed m-health based care. M-Health will be increasingly used for doctor consultation, health tracking, health compliance and adherence, health records, diagnosis and patient engagement. M-Health will play a key role in value-based care model by tracking outcomes interfaced with personal tracking devices and remote health system.
Artificial intelligence enabled care 	Healthcare 3.0 will witness convergence of human intelligence and artificial intelligence in delivering better preventive and curative care. AI will be one of the key tools to bridge the gap of specialists, doctors and skilled healthcare workforce in India. At present limited number of private providers have piloted AI for diagnosis and treatment planning for cancer and monitoring of other chronic conditions such as diabetes, cholesterol, fertility issues and cardiac health. However, the future will witness greater implementation in areas like: • **Clinical decision support system (CDSS):** Leveraging AI to alleviate overburdened doctors ,supporting them in administrative tasks and allowing to precisely diagnose patients using large set of clinical data and images. CDSS will transform rural healthcare wherein doctor availability is a big challenge • **Computation pathology:** Use of AI for assistance in comprehensively inspecting samples from patients to detect any anticipated health condition or diagnostic requirement • **AI assisted primary care:** Chatbots which use smart algorithms to help patients track and understand their health data, assist in medication management, and disperse simple medical advice, would be leveraged for reducing the burden on physicians • **Drug discovery:** Mining patient's clinical data and scientific literature to gather meaningful medical insights and further improving current therapies and creating novel therapies AI will prove to be a major supporting pillar to healthcare sector, and is anticipated to complement the effort of doctors – not entirely replacing them.

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IoT in healthcare 	Healthcare IoT or Internet-of-Medical-Things (IoMT) is a network of medical devices that feed vital data in real time and software application that analyse and communicate with healthcare IT systems. The applications of IoT are expected to gradually knit into the healthcare ecosystem, both at a physician's as well as at a patient's site. Connecting medical devices, such as ultrasound, thermometers, glucose monitors and electrocardiograms used for tracking patients' overall health; smart beds in hospitals to circumvent the need of nurses; and smart medication dispensers at homes that automatically upload information into the cloud, show the extent of IoT potential in the healthcare industry. IoT presents a plethora of opportunities for improvement in the Indian healthcare system: • **IoT in Critical care:** IoT-enabled ICUs, emergency care units and operating theaters will enable digital transfer and exchange of patient critical care data to enable better care management by a clinician through remote access. • **IoT-enabled PoC:** Point-of-Care (PoC) technologies for bedside monitoring, including devices such as sensors and wearable devices, can leverage the concept of IoT, by feeding health data directly from the patients' site to a central repository. • **Remote health management:** In future, an affordable and user-friendly telehealth platform and in-home monitoring devices will make in-home patient monitoring prominent. It would also allow remote healthcare providers and caregivers to be informed in real-time of any situation and would improve access of healthcare services. • **Training physicians and patient compliance:** The scope of IoT ranges from training physicians to ensuring treatment compliance for patients. Gamification can be used specifically for encouraging patients to follow their treatment regimes. • **IoT enabled treatment management:** Significant amount of health data gets generated by means remote monitoring, smart devices and medical devices integration can be used for improving the treatment protocols of healthcare ailments as well as improving the way care is delivered.
Wearables, digestible and implantable 	The emergence of wearable, digestible and implantable sensors allows to engage and encourage patients towards a healthy lifestyle, where the healthcare provider (clinicians) can continuously monitor both health and wellness in real-time. In times ahead, implantable would find greater use in tracking vital signs and health activity in real-time, through smartphone connectivity. Medical device companies are working towards developing implantable cardiac monitor that can track cardiac activity and transmit the data to a smartphone via blue-tooth connectivity. Implantable/ wearables would also play a crucial role in chronic disease management. In future, the usage would allow predicting the onset of acute episodes of a disease, effectively managing patients suffering from ailments such as epilepsy and diabetes.

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Augmented and virtual reality 	Indian healthcare sector will adopt augmented reality (AR) and virtual reality (VR) with wide application across value chain, including consultation, diagnosis, training, patient education and treatment. It is anticipated that the value of AR and VR in healthcare will grow significantly – particularly as integration with AI, sensors and bio-feedback becomes more sophisticated. A few key applications of AR/VR include: • **VR based doctor consultation:** Using VR technology for consultation by doctor and patient will be able to provide consistent eye-to-eye contact and also deliver essential services like pulse examination and emotion reading (vital for psychological therapy consultations) to a doctor • **Diagnostics:** AR can enable visualising information coming from sensors into one cohesive interface to show potential causes of a patient's state via analysis. Using AR- a doctor will able to look through the layers of patient body without any incision. All this can increase the precision of diagnosis • **Practicing surgery runs:** AR and VR simulations can assist in optimising the sequences in a surgery and formulate a course of action for any circumstances • **Medical education:** AR/VR will be used in imparting training to the healthcare workforce. The technology provides insights into the human body and nuances of body functions, which enable effective training of the medical workforce
Medical drones 	The age of drones is upon us – both autonomous flying and driving have become a reality. Drones are already delivering medicine, blood and even organs to rural communities and remote areas around the world. India has also taken a step towards this, with partnership of Government of Maharashtra with a California-based automated logistic company (2019). The drones provided by the company will assist in delivering emergency medicine and critical care across the state of Maharashtra
3-D printing technology 	Also known as 'additive technology', requires a layer-on-layer addition of materials to develop a three-dimensional model of physical customized medical equipment and products from a digital model. Coupled with a much better success rates in 3-D printing casts, with bones getting healed 40-80 percent faster than in traditional casts, and 3-D printed pills that completely alter the release rates of drugs, the technology is bound to grow[9]. Indian healthcare providers have already started using 3D printed medical implants, for instance in 2018, a joint hip replacement surgery was conducted at AIIMS, Delhi, using a 3D printed medical implant[10] .
Digitisation of medical records 	Government has already envisaged National Health Stack (NHS), which would be a centralized repository for all citizens of the country and would enable in streamlining healthcare information. While in private sector, which caters to nearly 75 per cent of the outpatients and more than 60 per cent of the inpatients, there is lack of collaboration preventing the full realisation EMR. This necessitates government to bring private establishments on-board for sharing health information. One such effort includes Ayushman Bharat PMJAY scheme, where government is working with private players. In times ahead, private players would require to share information with the patients and network, which could be further used for subsequent visit or treatment of the patient. Also, Government envisages to create Personal Health Identifier (PHI) for maintenance of health records. This would also make it important for the private players to maintain a comprehensive health record of the patients that can be further linked to the patient health records.

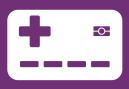
9. 3D Printing Is Already Changing Health Care, Harvard Business Review, March 2016, accessed on 23 January 2020
10. AIIMS performs surgery using 3D printed medical implant, BioSpectrum India, May 2018, accessed on 23 January 2020

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Blockchain in healthcare 	A blockchain is a decentralized database, or digital ledger, of transactions that is visible to everyone on a chain of systems collectively managed by a peer-to-peer network. With focus on digitisation of medical records, the technology would assist in providing increased and secure control to patients over their medical records. Also, increasing coverage under public schemes such as coverage by Ayushman Bharat, blockchain could be leveraged for automatic verification and authorisation, avoiding back-and-forth between multiple parties and making claim processing faster and more efficient

3) New avatar of healthcare providers

Healthcare providers in the coming decade will be pushed to relook at their physical environment and design, operating model, technology enablement, and cost containment to cater to newer needs and devise engagement strategy with smarter consumer. Digitally enabled models in other sectors have set high expectations for digital healthcare services. Patients are no longer passive participants in their health care. They are demanding transparency, convenience, access, and personalised products and services. The access and the control over personal health data has eventually increased with time. There has been a gradual shift to prevention and well-being from the earlier curative approach. This has led to an innovation in the care model offered by the healthcare service providers[11]. Healthcare 3.0 will witness leaner and specialised facilities in a newer avatar.

Leaner and specialised healthcare facilities 	Real estate cost, limited availability of capital and demand for specialised care will propel for smaller and leaner health facilities focusing on single or fewer specialties. The coming decade will see resurgence of nursing homes in the form of community hospitals with 20 to 40 in-patient beds and ambulatory care centres with OPDs, diagnostics and 5 to 10 in-patient beds to cater larger patient base. Hybrid model of virtual care network embedded with community hospital and ambulatory care centres will foster offline and online healthcare service model in the future.
Increased insured patients 	It is estimated that more than 70 per cent population of India is covered under AB-PMJAY, private insurance and other government funded health schemes such as CGHS, ESIS, Railways, and ECHS. Increasing insurance patient base will lead to benchmarking and price standardisation of packages and procedure by a government body, insurance companies and corporate clients. Healthcare providers in the coming decade will be pressed to create significant service and facility differentiation to command higher price point from cash and corporate patients. Small to medium hospitals specifically focusing on insurance and government health schemes will emerge in the coming decade mainly in Teir-2 and Tier-3 cities. Providers will have to adopt segment wise facility business models, like few hotel players catering to high end to economical travelers under different brand name with service and facility differentiation.
On-demand healthcare services 	Healthcare providers need to reconfigure existing business model and operations to provide on-demand services at health facility, home healthcare and virtual care. Smart consumers will seek on-demand 24x7 doctor consultation, weekend and night OPDs, home care visits, sample collection, virtual consultation and services without the constrains of time, place and commuting.

11. 2020 Global Healthcare Outlook, Deloitte, accessed on 18th January 2020

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Personal health advise application and virtual care 	Applications with health data will provide consumers personal advice and navigate to virtual network of clinicians or connect to their family physician. Personal health advise app with AI enabled chatbot will cater to wellness, primary care, fitness, NCDs, second opinion and other needs of smarter consumers in the coming times.
Health service aggregators 	Health service aggregators, in line with travel portals popular among consumers, will emerge as single platform for all online and offline delivery of healthcare needs. Such platforms will aggregate diagnostic services, coordinate with healthcare providers on the behalf of patient, schedule appointment, schedule cabs services for pick up and drop, deliver medicines, track health data to plan customised fitness and wellness plan and other similar healthcare services.
Wellness providers 	The demand for wellness is rapidly increasing as consumers are becoming more aware of overall wellness. While Indian players have forayed in the wellness industry, the potential remains largely untapped. Consumers and their needs will continue to evolve, driving the transition from remedial care to a more holistic view on preventive care.
Digital clinics 	Apart from General practitioner clinics and health centres, digital clinics will emerge with telemedicine, VR enabled virtual consultation, point care of diagnostics, remote health monitoring system, medicine dispensing machine and equipped with clinical decision support system and referral management system.
Air ambulance providers 	Air ambulances will form critical part of emergency response management system and demand will increase in the next decade due to increasing traffic in urban areas and limited specialized care facilities in the rural areas. Very few airline carriers are equipped for medical evacuation services and the overall cost for the service is not affordable to the general community at large. Many government and Urban Local Bodies will be forced to set up air ambulances to augment their emergency response management system.

4) Innovative diagnosis and treatment

The shift from curative to preventive treatment has been the driving force for the evolution of healthcare. From collecting data non-invasively, predicting the probability of diseases and disorders in an individual to prescribing a custom-made treatment plan best suited according to one's genetic make-up, newer ways of treatment and diagnosis are going to revolutionize the way healthcare is sought, while making it transparent, highly automated and sustainable. Though still in an early stage, there are massive opportunities in telehealth, remote patient monitoring and behaviour modifications.

Robotic surgery 	Private hospital chains in India have already started using robotic systems for minimally-invasive surgeries. Robot-assisted surgeries provide enhanced precision and utmost control while performing surgeries, such as those related to prostate cancer, where it is critical to protect the nerve fibers and blood vessels attached to glands. The increasing focus of hospitals on patient centricity and superior patient outcome are encouraging the adoption of new-age techniques. Healthcare 3.0 is expected to have a deeper penetration of robotics surgery for specialised and complex surgical procedures.

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Gene therapy 	The technique uses genes to treat or prevent disease. The technique is allowing doctors to treat a disorder by inserting a gene into a patient's cells instead of using drugs or surgery. The technology in India is still is at a very nascent stage. Under the new national guidelines, germ-line gene therapy remains prohibited in India and only the somatic cell gene therapy is an acceptable approach as it affects targeted cells or organs in the patient and is not passed on to subsequent generations. In August 2019, Government has proposed constituting a new Gene Therapy Advisory and Evaluation Committee (GTAEC) — comprising scientists and clinicians — to rigorously monitor all clinical trials of gene therapy in India. ICMR is also setting up a task force for gene therapy research to encourage research. With efforts towards streamlining regulations on gene therapy, the technology is expected to become prominent in another 8-10 years. However, challenges such as high cost of gene therapy, adequate insurance coverage and management practices among treating physicians, are expected to limit its growth potential.
Precision medicine 	Also known as 'Personalised Medicine' and refers to delivering the right treatment to the right patient at the right time, by customizing disease treatment according to a person's genetic makeup. With emergence of Big Data in healthcare, the Precision Medicine market in India is expected to grow substantially with oncology and CNS to hold dominance over the market shares. Also, with a step towards the DNA Technology (Use and Application) Regulation Bill 2019, the regulatory framework in terms of providing guidelines would be in place, taking care of the diverse regulatory challenges.
Evidence based medicine (EBM) 	Refers to utilisation of the best evidence in concluding an assessment of the care to be given to patients. With increase in the use of electronic medical records in acute care opens an alternative to evidence-based practice for clinicians during lack of evidence. Use of data analytics to unravel information stored in unstructured clinical notes, clinicians can draw meaningful medical insights. Also, advent of quantum computing to assist in genome sequencing and allowing analysis of large clinical data will act as an enabler of EBM. Though a few pharma companies are already considering India as lucrative market for evidence-based medicine, however, the practice is likely to gain visibility in another 6-7 years.
Non-invasive diagnosis 	The market of non-invasive diagnosis is largely driven by the prevalence of chronic diseases such as cardiovascular diseases and neurological diseases. With the completion of Human Genome Project, that made available huge information based on genomic and proteomic analyses, non-invasive cancer diagnostics are gaining traction over conventional diagnostic methods. Also, AI based tools are becoming prominent especially for cancer and diabetes predictions. Big hospitals have already started investing in AI based technologies for diagnosing cancer and assessing evidence based cancer care options.

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5) Budding hybrid healthcare workforce

Dearth of healthcare personnel will intensify in the next decade and while entering Healthcare 3.0, providers need to tackle this issue by leveraging and ensuring adequate training to the existing and upcoming professional in the sector. With less than one doctor per 10,000 population and ever rising healthcare demand, allied healthcare staff will play a crucial role.

Also, the future of healthcare is expected to witness a close association between healthcare workforce advances in artificial intelligence – cognitive computing, deep learning and machine learning. Use of concepts such as machine learning are assisting in minimising manual interventions by automating suturing and evaluating surgical skills and workflow modelling in robotic surgeries. AI-enabled robots and surgical systems can decrease operation errors, incur minimal damage and increase the level of precision and reducing the recovery time. Technology companies are collaborating with medical device companies to develop robots to aid in minimally-invasive surgeries and provide greater control.

Extended roles of nurses and paramedics 	Nurses form one of the largest segments of healthcare workforce and the market is witnessing an increase in the demand for nurses specialising in specific areas of medicine such as psychiatry, obstetrics, gerontology among others. Nurses and paramedics will take up extended roles which could mean anything from taking on new responsibilities – such as nurse prescribing – to stepping into a new professional space, such as CHO (Community Health Officer) in Health and Wellness Centres, to tackle the shortage of professionals, especially in rural areas.
Demand for skilled labor and specialised workforce 	With changing healthcare landscape, the demand for skilled labor and specialized healthcare workforce has become utmost important. Current healthcare system is facing issues such as inadequate ability to adhere to standards of hospital procedures, lack of effective communication skills and inadequate exposure to modern technology. To ensure the complete adoption of technology and new operating model, there is a need for developing specialised workforce. Focusing more on the continuous learning programs, hands-on experience to AI based systems, IoT devices and remote monitoring equipment on a regular basis. Besides building a technical knowledge base, there is also a need for imparting soft skills, which is required for handling a demanding and aware patient.
Emergence of robotic healthcare workforce 	In India, robotic-assisted surgeries have been well picked up by private hospital players. These surgeries are expected to gain more acceptability amongst patients as they are more precise, less painful and ensure early recovery. Surgical robots are especially suitable for cancer-related surgeries as they can lower complications, hospital re-admission and mortality, as compared to traditional open surgeries[12]. Also, increasing number of cancer patients in India and a growing influx of medical value travelers are leading to a greater adoption of new-age surgical robots in hospitals in metro cities. With all these advances, robotic surgeries are set to make inroads into tier-II and tier-III cities in India in another 4-5 years.

12. Cancer relief via robot, The Hindu Business Line, January 2019, accessed on 23 January 2020

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6) Growing regulatory and governance framework

Indian healthcare sector in the last decade made a notable progress towards enhancing regulatory and governance framework and the government is further expected to tighten the regulations. Increasing environmental compliance, waste management, price control, reporting of outcomes, safety & security and other regulatory compliances will remain a top priority of the government and providers.

Personal data protection 	With increasing digitisation and information technology becoming an integral part of modern society, there is a growing concern that too much data containing personal information is stored by different actors in society and that this could potentially be harmful for the individual. The Personal Data Protection Bill, draft Digital Information Security in Health Care Act (DISHA) and other such regulations will demand stringent compliances and safeguarding of personal and medical records by healthcare providers. These Acts seek to enforce a strong legal framework to preserve the sanctity of "consent" in data sharing and penalize those breaching privacy norms. Indian healthcare providers are required to take stock of their current system & processes around data security & management and mitigate any gaps by adopting robust technology, security systems and controls.
Simplification of large number of regulatory compliances 	The next decade indicates need simplification of various regulations and approvals required for setting up and operating of healthcare facilities in India. There is a need to draw reference from other sectors and measures undertaken to boost a sector like curtailment of obsolete regulations, single window clearance, ease of doing business and other such steps that simplifies setting up and operating of healthcare facilities and new model of care.
Reporting of health outcomes 	India sooner or later will move towards mandatory reporting of health outcomes and Key Patient Indicators that will drive transparency, higher compliance and better regulation of providers. Providers will be required to monitor their patients post care and track outcomes to deliver better care. Such initiative will form a base for value-based healthcare system led by government, insurers and providers to remunerate their doctors. Smart consumer with a high degree of health awareness and patient rights and regulatory framework will further push legal and consumer litigations pressing healthcare providers to augment government, compliance and controls.
National Healthcare Benchmarking Platform 	A National Healthcare Benchmarking platform would be required in the next decade and would also form a fundamental element of Healthcare 3.0. India is likely to embark on National Healthcare Benchmarking journey led by healthcare providers or government, independently or jointly. Various countries have implemented National Healthcare Benchmarking to drive transparency, foster competitiveness and regulate services & costs.

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3 Shifting gears for healthcare 3.0

The Indian private healthcare provider's success shall be largely defined by a three-pronged comprehensive strategy by reconfiguring, reinventing and repositioning. The success in the coming decade will not be attributed to largest provider but to the one who is highly digital, strongly engaged with their consumers, able to create newer markets and leverage data analytics to proactively respond with personalised care.

To plan for Healthcare 3.0, providers need to kick start their journey at the earliest and shift following ten critical gears for new age healthcare services.

1 Understanding smart consumers' behaviour and emerging needs

It will be critical for healthcare providers to develop good understanding of changing smart consumer behaviours and their needs. Providers must relook at a patient as a smart consumer and reconfigure their services and business models accordingly. The buying cycle would be fluid that is likely to demand quicker response to their needs and provide personalised care. It will be important to understand the complete patient journey in the new age and shift from mitigating only pain points to designing experiences as per patients' needs.



2 Extensive smart consumer engagement

The way of merely catering to episodic healthcare events in the hospitals will eventually become obsolete and will require providers to go an extra mile to engage and retain patients as customers and need to focus on comprehensive care. With rising awareness among the patients, prevention would be considered more important than treatment and providers need to align themselves accordingly. Healthcare providers will need to build trust among the patients by not only treating them in the hospital but also by counselling them along each step of their individual care journey.





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3

Benchmark and learn from other sectors

To survive in the next decade, it will be important for healthcare providers to unlearn many of their existing practices and learn newer things around the way they operate and perceive patients. Digital technology enabled consumer services business has set new expectations and benchmarks and will continue to drive consumer behavior in coming times. Healthcare providers will need to look beyond healthcare sector to learn from innovative service models and practices.



4

Healthcare as a service instead of infrastructure

Healthcare providers have considered physical infrastructure at a center of healthcare services and focused on building capital intensive high-end physical infrastructure. They focus more on responding to episodic events instead of patient engagement, reaching out to patients and being part of their overall health management. Healthcare providers would need to reach a large consumer base beyond healthcare facility, leverage digital technology and adopt leaner and specialized care models that brings them closer to an individual or community. Providers need to act as a safe custodian and advisors to an individual and community in managing their health and wellness requirements on day to day basis.



5

Collaboration across value chain versus competition

Healthcare providers are expected to witness a rapid entry of large number of innovative healthcare solution providers leveraging digital technology, aggregating various healthcare services and reaching a large consumer base. The new entrants would engage at very early stage of decision-making process and buying cycle, eventually making such players a critical stakeholder in the new healthcare value chain. In times ahead, the providers need to explore collaboration models to leverage each other's value proposition and create a comprehensive care model built on multi-platform and multiformat to cater to smart consumers.



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6

Redesign operations and drive efficiency

Changing consumer behavior and changing ecosystem of consumer services is likely to push healthcare providers to relook and redesign their decade old processes and policies that has built-in high degree of inefficiencies and resistance to evolve. Smart consumers are expected to demand quicker, anytime and anywhere services, compelling providers to redesign their physical infrastructure, undertake process reengineering, adopt single point delivery, ensure minimal turnaround time, deploy skilled caregivers, embed digital technology and ensure cost containment.



7

Think digital and invest in digital technologies

The competitiveness in healthcare services in the next decade will be largely defined by digital technologies and data enabled care. Healthcare providers need to embark on digital journey by automating manual processes, digitize medical records, implement IOMT/ AI/ ML and leverage data analytics to enhance customer experience and personalised care. Use of robotic process automation to automate rule-based tasks and gradually move towards the use of AI to automate tasks that require cognitive abilities is expected to become prominent in the future. Healthcare providers need to invest heavily in digital technologies in the coming times to stay relevant, engaged, sustainable and successful.



8

Digital literacy and skilled workforce

Healthcare providers will have to augment current organisation capacity with digital literacy from top to bottom. An efficient and tech enabled workforce would allow a provider to not only adapt to the changing landscape but would also improve the bottom line. Smart consumers are likely to be connected with their care givers through various digital platforms. Healthcare providers with better digitally skilled workforce will be more productive and competitive in the coming times. Leadership team will be required to build comprehensive digital strategy and creating a role of Chief Information Officer (CIO) in healthcare will be critical to create digitally enabled healthcare organisations.

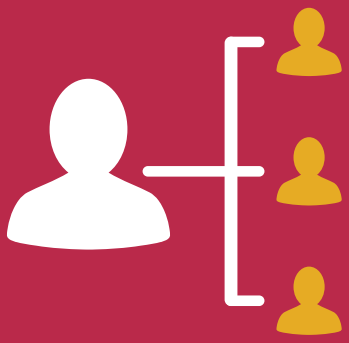


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9

Establish an agile but robust governance structure

With changing regulatory environment and growing demand for transparency by patients, there is a need for providers to realign their processes and governance structure. Providers need to be highly vigilant, institute mechanisms to have clear visibility on compliances and require deploying a robust risk mitigation plan. It is also essential to have an empowered executive team with the influence to implement agreed-upon change, strive for continuous improvement and embrace technology. A leadership with comprehensive knowledge of latest technology trends would be able to take better decisions



10

Seek healthy partnerships

Changing healthcare landscape and focus on achieving UHC by 2030 is likely to force public and private players to explore innovative healthy partnership models. Private healthcare providers are expected to venture into Tier-3 cities and rural areas to seek opportunities created by increasing health coverage. The healthcare market is likely to witness more collaborative initiatives such as development of forum to foster dialogue between public and private partners and a shift from procurement to partnership mode.



The market forces will play a key role in shaping the new age healthcare landscape and such inevitable change will demand timely action. The older strategies and operations adopted by Indian private healthcare providers may not ensure healthy returns in the coming decade. The winner in times ahead would be the one who responds and adapts quickly to these market forces, acts strategically to tackle the challenges and leverages opportunities in the market.

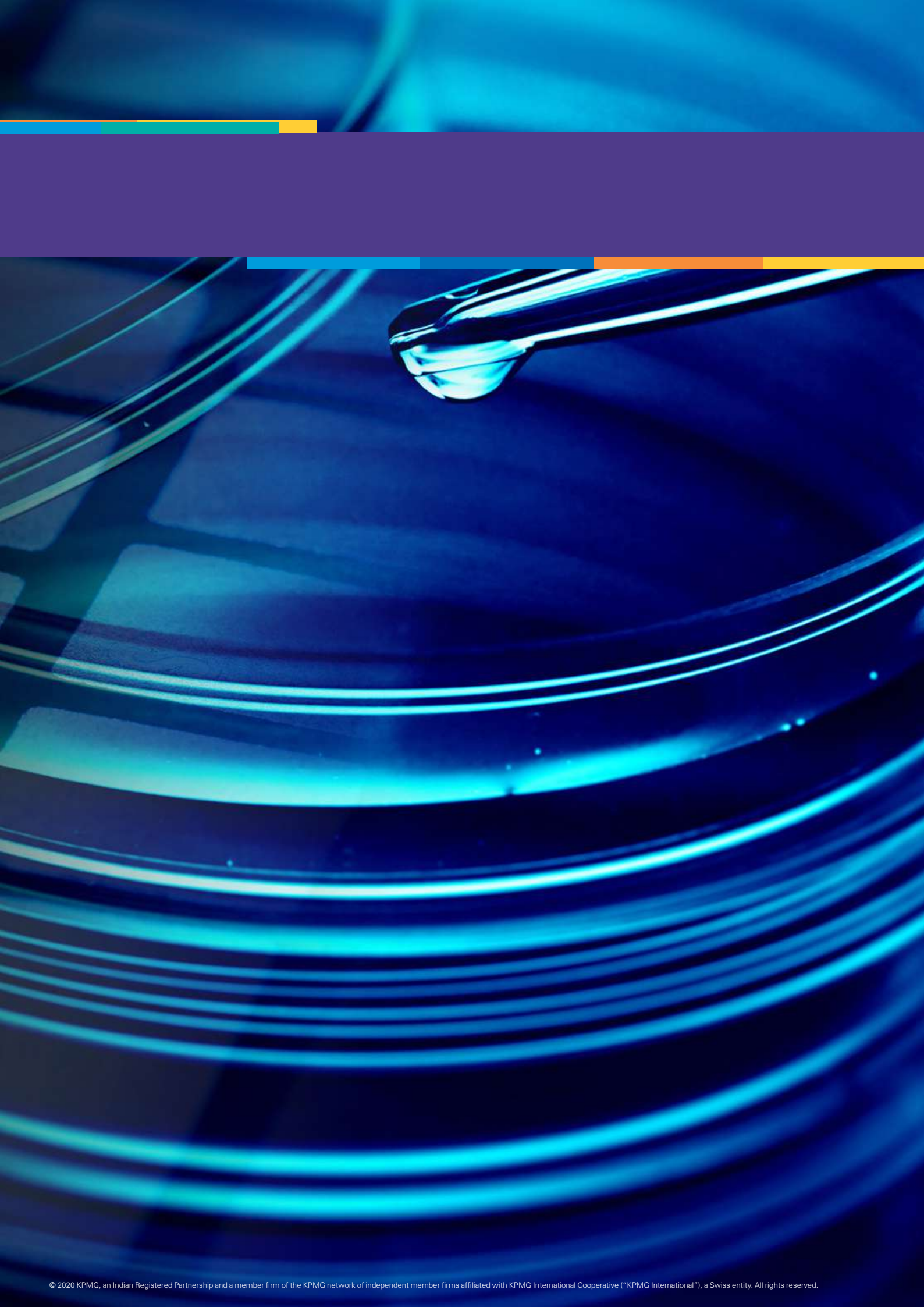


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4 List of abbreviations

- **AB-PMJAY:** Ayushman Bharat - Pradhan Mantri Jan Arogya Yojana
- **AI:** Artificial Intelligence
- **AIIMS:** All India Institute of Medical Science
- **AR:** Augmented Reality (AR)
- **CDs:** Communicable Diseases
- **CDSS:** Clinical Decision Support System
- **CGHS:** Central Government Health Scheme
- **CHO:** Community Health Officer
- **DISHA:** Digital Information Security in Health Care Act
- **EBM:** Evidence Based Medicine
- **ECHS:** Ex-servicemen Contributory Health Scheme
- **EMR:** Electronic Medical Records
- **ESIS:** Employment State Insurance Scheme
- **GTAEC:** Gene Therapy Advisory and Evaluation
- **IoMT:** Internet-of-Medical-Things
- **IoT:** Internet-of-Things
- **JCI:** Joint Commission International
- **KPIs:** Key Performance Indicators
- **M-Health:** Mobile Health
- **ML:** Machine Learning
- **NABH:** National Accreditation Board for Hospitals
- **NCDs:** Non-Communicable Diseases
- **NHA:** National Health Authority
- **NHS:** National Health Stack
- **NITI Aayoga:** National Institution for Transforming India Aayog
- **OPD:** Outpatient Department
- **PHI:** Personal Health Identifier
- **POC:** Point-of-Care
- **SDGs:** Sustainable Development Goals
- **UHC:** Universal Health Coverage
- **VR:** Virtual Reality

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